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Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

No. 151

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26 February 1981

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Forty years ago, the U.S. Government inaugurated a new service to monitor foreign public broadcasts. A few years later a similar group was established to exploit the foreign press. From the merger of these organizations evolved the present-day FBIS. Our constant goal throughout has been to provide our readers with rapid, accurate, and comprehensive reporting from the public media worldwide.

On behalf of all of us in FBIS I wish to express appreciation to our readers who have guided our efforts throughout the years.

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NEAR EAST AND NORTH AFRICA

SUB-SAHARAN AFRICA

BRIEFS

JAPANESE NETWORK FOR IRAQ--Baghdad, (INA)--Iraq signed a 70 million dinar contract (217 million dollars approx.) with a Japanese consortium for the construction of an international telecommunications network in Iraq. The contract, signed here today by Revolution Command Council member and Minister of Transport and Communications Sa'dun Ghaydan, will envisage the organization of international telecommunications and radio waves through the use of computers. It also covers the supply and erection of the networks equipments [as received] and training of Iraqi technical cadres for the commissioning and maintenance of the network as well as the construction of necessary buildings for same. [Text] [JN251542 Baghdad INA in English 1530 GMT 25 Feb 81]

CSO: 5500

BRIEFS

SPACE TECHNOLOGY SEMINAR--Mr. Piere Chechan, Commercial Director, Society of European Population (SEP), the leading manufacturer of space rockets in Europe, delivered lecture at a seminar on "Application of space technology and remote sensing in resource survey and environmental monitoring" in Dacca recently. The seminar was organised by the Bangladesh Space Research and Remote Sensing Organisation (Sparrso). Mr. Chechan was on a visit to Bangladesh to finalise a contract with Sparrso for setting up a ground satellite station for resource survey in Bangladesh. Mr. I. Sattar, original designer of visible intra-red processing system (Vizir) for SEP, who came to Dacca on a technical visit to finalise the specifications for the instrumentation of the ground station to be set up in Dacca, also presented a paper at the seminar. [Text] [Dacca THE BANGLADESH TIMES in English 28 Jan 81 p 3]

TELECOMMUNICATIONS SUBCENTER--Chilimpur (Chittagong), Jan 27: Minister for Posts, Telegraphs and Telephones, Mr Mayeedul Islam, today opened a telecommunication sub centre here, reports BSS. The sub-centre, a project under West German collaboration, will provide training to lower-level technicians including Lineman, Wiremen and Operators. [as published] Speaking on the occasion, the Minister said massive training programme had been taken up to create more skilled hands for the improvement of telecommunication service. He said a 1,000-line Sagarika exchange would be operative within a month in Chittagong, besides adding 5,000 lines to the existing ones in the next six months. He also said Chittagong-Dacca STD line would be increased from 72 to 144 channels soon. Mr Rafiqullah Chowdhury, MP-Gonofrant, also spoke on the occasion. [Text] [Dacca THE BANGLADESH TIMES in English 28 Jan 81 p 12]

NATIONWIDE DIALING PLANNED--Kaptai, Jan. 28:--Direct dialling system between Dacca and Cox's Bazar will be commissioned by the end of February next, a high level meeting of the T and T officials was informed here today, reports ENA. Presided over by Posts, Telegraphs and Telephones Minister Mayeedul Islam the meeting reviewed the telecommunication system of the Chittagong Hill Tracts. The meeting was further told that the T and T Board has taken up a number of short and long-term projects to improve and expand the existing telecommunication system of the district including introduction of direct dialling system between Rangamati and Dacca. The T and T Board has also taken up a scheme for interconnecting all the headquarters and other important places with the district headquarters by high frequency radio links. The Minister also disclosed that nation-wide trunk dialling system will be introduced all over the country by 1983 at an estimated expenditure of Tk. 30 crore of which Tk. 16 crore will be in foreign exchange. The meeting was attended among others by Mr A B M Taher Chairman of the T&T Board. [Text] [Dacca THE BANGLADESH OBSERVER in English 29 Jan 81 p 8]

CSO: 5500

WRITER SCORES GOVERNMENT USE OF DATA BANKS

Calcutta THE STATESMAN in English 19, 20 Jan 81

[19 Jan 81, p 6]

[Text] Recently, an old Indian firm manufacturing an assortment of about 600 products discovered to its surprise that 60% of its profits came from only two products. The revelation came barely two years after the company had put its accounts--spread over a network of thousands of factories, offices and retail stores throughout the country--on a computer system.

Any number of such examples can be cited to prove the point that the vast amount of data that lies buried in Government files all over India is of little practical use in framing policies and taking decisions that would ensure optimum returns unless it is processed through the modern data processing systems which the electronic revolution of the past three decades has placed at our disposal. So rapid are the developments in the field that systems which were considered to be the last word in computer science till only a few years ago are on the point of being declared obsolete. The very concept of the computer has changed from a fast accounting machine that would render millions jobless to that of an information processing facility that would identify bottlenecks and potentialities and help take the right decisions to accelerate economic growth and generate more jobs.

The country's leading planners and administrators are now beginning to admit, at least in private, that they are handicapped by the lack of adequate data. Even when raw statistics are available, the means to process these are not. And unprocessed data are not only meaningless, they can be deceptive and lead policy makers to wrong decisions which often result in dangerous distortions in the economy. Experts make a distinction between "data" and "information" which is data in processed form. They recognize "information" as a commodity, a vital input in development which is not less important than power, cement or steel. From this realization has emerged, the world over, the new billion-dollar "information" or "data processing" industry. Government departments, business organizations, industries, railways, power systems and research institutions, among others, are putting the whole range of their operations, from planning to execution, on computer.

Next Stage

In advanced countries the next stage, which does not seem very far, a domestic version of the micro-processor--a table-sized computer--is well on the way to

becoming a household gadget. Practically any information on any subject not marked secret could be had almost instantly on the TV screen in the sitting room by making a telephone call to the nearest data bank. Dictatorial regimes would find it difficult to withhold from their subjects facts which any person anywhere could gather directly by dialling an international data bank through a space satellite.

In developing countries like India the advent of the electronic age is beset with many problems. First, the place of "information" as one of the most important inputs in development, while appreciated by some experts, is not yet fully recognized by those at the helm of affairs. The few who understand its importance are uncertain about what needs to be done. More often than not they look upon "information" as a Government monopoly, a static commodity to be stored at one point and retrieved by the authorized users for their exclusive use. They are generally allergic to the modern multi-point "network" concept under which information of diverse kinds is stored and processed at hundreds of places and freely shared between them. Ultimately this concept should lead to a global network of literally "all" worthwhile information which would be freely accessible to any citizen, albeit on payment.

New Technology

The fundamental character of "information" in the new electronic terminology is of a product or commodity that "flows". Its utility and potential are enhanced with the increase in the number of points between which it can be freely exchanged. The authorities in India and in almost all developing countries are beginning to show interest in the new technology to store and use information for their own limited purposes but they are afraid to allow it to flow. They are reluctant to permit even a limited measure of autonomy to such harmless "networks" as the one proposed by the UNDP to organize a regular flow of developmental information between developing countries through a computerized data bank. Each government wants to supervise and control the information about its own country that is fed into the "network". Needless to say, the end product of such a "network" would be a propaganda pool of concerned governments whose credibility would be highly suspect and whose effectiveness would be confined to information--often garbled and exaggerated--about the "success" of a few isolated development schemes. For such information can be misleading unless one has free access to all the related facts.

This insular attitude towards information has made it difficult for the Indian Government to organize an efficient data-sharing system within its own departments. Each department is shy of giving data to another department. Within the same Ministry officers of one division find it difficult to ferret out facts from another though the heads of the two divisions may be sitting in adjoining rooms. Even within the Planning Commission which is supposed to be a pool of all economic information, the different divisions have built high walls of secrecy which can be broken only at the apex levels. Horizontal communication is minimal.

The Government's data processing and dissemination agencies function under severe constraints. One example should suffice. In the past, countrywide data released by the Government used to give State-wise break-ups without which any meaningful study of the development process becomes difficult. Then suddenly, about a decade

ago, compilation of State-wise data became taboo at the Centre. The reason: it was exposing regional imbalances in economic growth. Today even senior officials in the Government find it difficult to get State-wise data in a hurry.

The Government's allergy to parting with information cuts across party lines. Certain unwritten restraints on contacts between newspapermen and officials were placed during the Emergency. To the journalists' surprise, the Janata Government not only did little to remove those restraints but added a few of its own by introducing the theory that the Press Information Bureau should be "in the picture" whenever a journalist tries to work independently on a story about Government activity.

The trend towards centralizing the flow of all governmental information continues. Even public sector undertakings are being advised to get clearance from the Information Officers of the concerned Ministries before supplying information or arranging interviews sought by the Press. The recent reported statement of Mr V. P. Sathe, Union Minister for Information and Broadcasting, that All India Radio should not have carried agency reports of the Nagpur rally but should have relied on its own correspondent speaks of the Government's determination to give out only one-sided information to the people.

Not all the latest technological improvements in the field of information, such as computerized data bank systems run by the Government or international agencies like the UNDP, can increase the flow of information to the people so long as these systems are owned and operated by the Government and the release of facts and data from them is regulated by a centralized agency like the Press Information Bureau which acts more like a censor than a news source.

Data Banks

In the circumstances, it seems necessary to develop powerfully equipped non-governmental data banks accessible to all on payment. Quite often valuable information sought by journalists, M.P.s, economists and experts is lying scattered in published documents all over the country but the Government simply refuses to give it when asked. In a democratic society it should be the duty of the Government to provide funds for the creation of a completely autonomous data bank on the pattern of the computerized information service provided by the Library of Congress in the USA. But the Government in this country is unlikely to be so obliging. Private efforts should be made to bridge the gap. Otherwise, armed with the latest technological tools, the Government would vastly increase the potential of its information service, and, in the absence of an independent data system, the people would be defenceless against such propaganda.

[20 Jan 81, p 6]

[Text] THE Government's latest efforts in setting up a modern Rs 10-crore National Informatics Centre (NIC) with a Cyber-720 computer provided by the UNDP need to be seen in the context of its perennial anxiety to withold from the public facts which expose its failures. Some months ago the Planning Commission arranged a seminar between leading scientists heading national research organizations and the journalists covering their activities. Nearly all the Scientist-Director Generals and Secretaries present felt that the journalists were a pack of fools who needed to be educated so as to become efficient instruments of disseminating among the public what the former wanted to publicize. When the journalists demanded that it should be a two-way traffic so that the Press too could have easy access to the facts which it thought should be made public, there was no response from the august scientists. While the NIC enhances

the Government's capacity to marshal and manipulate facts to improve its image. It would be futile to expect from it a total picture needed for an objective analysis of any area of Government activity.

The NIC has come up with remarkable speed. Within less than six months of its formation the NIC computer has churned out voluminous and complicated reports for various departments and stored and assessed nearly 500 million words of data. It has shown capability to perform many complicated jobs for the Central Electricity Authority, the Bureau of Public Enterprises and the Indian Standards Institution.

The Central NIC computer—the largest in the country so far—is linked to about 20 mini-computers installed in various ministries in Delhi primarily to feed data to the main unit. Dr N. Seshgiri, its Executive Director, promises to set up within a couple of years "public booths" in Delhi—like a weighing or milk-vending machine — from which any citizen could draw information from the N... "archives", a separate data bank being built by him. So far the "archive" has stored a million words; a few million more will be added by the time it is launched. But, obviously, the NIC will divulge only what the Government wants it to—and no more. This is a matter beyond the reach of Dr Seshgiri and his enthusiastic team of young scientists and economists. For instance, the NIC will not have links with the States, which means that it will throw no light on the "dark area" of State-wise information.

ADVANCE WARNING

The modern data-processing systems are a highly versatile facility which can be used in a variety of ways. At the micro-level it can help a farmer to decide how to derive the maximum benefit from his small piece of land and at the macro-level it can also work out an optimal national crop plan. The phenomenon of alternating glut and scarcity we have been experiencing in recent years in vital commodities like sugar, potato and edible oils, with disastrous consequences to the economy and the poor growers, could be prevented by an efficient use of the modern management information systems. They can also give advance warning about the likely constraints in the availability of inputs such as power, transport, fertilizer, water and cement.

But these systems are not magic boxes which would provide the answers by the mere pressing of a button. Their effectiveness depends on the quality of the data fed to them and the way data are processed. Our method of data collection at the primary levels is hopelessly outdated and inadequate in every area of national activity. It is incapable of linking the input with the output. In the area of education, for instance, there exists virtually no data to link education to employment at all levels. Macaulay conceived our education system to churn out Babus, not farmers and skilled labourers such as artisans, technicians and craftsmen. Today we are employing for these jobs graduates with no aptitude for any kind of manual work. Evolving a sound job-oriented educational system for the whole country that would serve the manpower needs of the next century will involve collection and processing of voluminous data of a kind of which even a trace does not exist today. The result is half-baked plans and solutions offered by hundreds of self-styled "experts" leading to ad hoc decisions which have to be changed with every change of Government.

INADEQUATE DATA

Selection procedures for senior positions are equally arbitrary and outmoded. Notions of "competence" are highly subjective and generalized so that if a person has passed a UPSC examination or done well in a particular job, it is assumed he would do well in any position. This again is due to lack of adequate data either on the respective qualifications of the available candidates or on the precise requirements of each job. The yardsticks to judge "merit" are completely unrelated to the functional realities of a growing economy. The result is the work-teams do not match and more often than not fail to produce results.

Similar examples of mismatching can be cited in every area of economic and political activity because the mechanism to base decisions on hard facts has yet to develop even in bodies like the Planning Commission. To get dependable facts an efficient machinery of data collection will have to be organized.

Perhaps the most important area where modern management information systems could be highly useful is that of monitoring the progress of the thousands of development projects in the country and, later, providing a detailed feed-back on the benefits accruing from them after completion. This is a complex operation and can lead to wrong conclusions unless the right parameters are used for the study. An expensive irrigation project may be making speedy progress technically but the economic perspectives which made it worthwhile may have changed vastly since it was first initiated. An efficient monitoring and feed-back system is badly needed to ascertain whether numerous development projects are really yielding the benefits expected from them and whether similar schemes would be useful for future development. This needs scientific and computerized analysis of a vast amount of variegated data and cannot be done through superficial observations.

Data-processing is a highly complicated process. At present we are experimenting with numerous systems but eventually we should select one or two and stick to them to facilitate free exchange of information on countrywide networks. A wide range of technologies have been evolved to develop "models" of computer handling of different kinds of data. This requires a high degree of technical expertise and sensitivity on the part of the scientists and economists engaged in building the model. India is still a long way from acquiring the necessary specialization in this field though commendable breakthroughs have been made in limited areas by the NIC and others. Professor S. Sampath, a member of the Union Public Service Commission and a professor of Computer Science, has succeeded in computerizing the whole process of UPSC examinations involving lakhs of students and scores of cadres. This has speeded up the selection of officers reduced the possibility of errors and made the process more objective and impersonal. The Tamil Nadu police have built a computerized data bank of the finger prints of some 300,000 criminals and this has led to some remarkable successes in catching the culprits in major crimes. But the numerous computer companies that have sprung up in recent years often find it difficult to build efficient models for the complex demands of industrial organizations and research institutions.

The Government has set up a separate organization called

NISSAT (National Information System for Science and Technology) in the Department of Science and Technology to build a data bank of scientific information. Major R. Thiagrajan, Director of NISSAT, has estimated that in 1980 some six million articles were published in standard scientific periodicals. Information on such a vast scale fed by diverse sources should be put on multi-point distributive networks and not funnelled through a centralised computer, he feels. Accordingly NISSAT is building a multi-point network which though comparatively smaller in its origins might prove to be a more suitable information system for universal use than the NIC's centralised apparatus which would undoubtedly prove very useful to the Government but not to the public at large.

BIG GAP

Much of the investments now being made on computers would go waste until we mastered the art of "retrieval". The retrieval systems developed in India so far are unable to exploit the full informative potential of the facts and figures stored in the data banks. They provide only limited answers to comparatively simple problems. The users are not conversant with the whole range of questions that they can ask of a system and the manner of asking them. A big communication gap exists between the machine and the user.

All this shows that the whole process of inducting the new information technology is subject to a wide range of options at each stage—from the collection of primary data to that of retrieval. In the years to come, as the computer-culture spreads—as it inevitably will—the options we exercise will largely determine whether we are going to have a closed or an open society and whether major decisions concerning growth are going to be exposed to intelligent public debate or are pushed through in closed-door meetings. So far the thrust of Government policy has been to build systems that would tell the people what it wants to tell them and not what they want to know. Such a system can hardly be expected to ensure "people's participation" in the process of development. Induction of new technology in the information system alone could not stimulate development unless it is used to build a two-way channel between the Government and the people. Otherwise it would only help choke off all constructive criticism.

CSO: 5500

NEW TELECOM FACILITIES PLANNED FOR RURAL AREAS

New Delhi PATRIOT in English 12 Jan 81 pp 1, 7

[Text] The Government proposes to introduce new technologies to improve communications facilities in the rural, hilly and backward areas of the country.

The Union Communication Ministry want to correct the urban-rural communications imbalance. Presently only 10 per cent of the entire national telephone network serves rural areas.

In the Ministry's Rs 2950 crore telecommunication development plan for 1980-85, the rural and backward areas will be given a higher priority than hitherto.

Backward areas in 18 districts have been selected for developing along the new lines which include direct application of developments in the field of electronics and digital communications in order to surmount constraints like difficult climatic conditions terrain and power shortage.

The districts and regions named are Purnea, Mehsana, Alleppey, Colaba, Sangrur, Barmer, Mathura, Sehore, Bhopal, Belgaum, North Lakhimpur, Koraput, South Arcot, Murshidabad, Jalpaiguri and the hilly areas of Kohima, Tuensang and Mokakchung.

In due course, the rural areas in Krishna, Nadiad and Agra districts are also to be covered.

The Ministry has also prepared plans to employ multi-access rural radio systems to provide long distance public telephones in some other areas. The systems will be introduced in Nizamabad, Mirzapur, Banda, Dhule, Morena, Garhwal, Imphal, Agartala, Mehsana, Kaithal and Nanguneri.

In the Indian National Satellite (INSAT) programme, earth stations are proposed to be set up in remote and hilly areas of Doda, Rajouri, Poonch, Kargil, Pahelgam in Jammu and Kashmir, Kalpa, Killong and Kulu in Himachal Pradesh, Jaisalmer in Rajasthan, Srinagar-Garhwal, Chamoli and Uttarkashi in Uttar Pradesh, Mangan in Sikkim, Bhawanipatna, Keonjhar and Phulbani in Orissa and Bomdila in Arunachal Pradesh.

Government is also thinking of relaxing the population criterion to cover more rural areas. After the new census more stations are expected to come within the

purview of the existing policy to provide telecommunication facilities. The proposal to set up 20,000 public call offices in the next five years would practically cover all the villages with a population of 5,000 in ordinary rural areas and 2,500 more in hilly and backward areas.

By the end of the plan period, the country will also move closer to the goal of nation-wide subscriber dialling facility. The proposal to instal 40 more trunk automatic exchanges (TAX) during the next five years will enable most of the district headquarters direct dialling facility. A total of about 600 stations will be on the national STD network by 1985 according to the Ministry's projections.

CSO: 5500

RADIO SEMINAR PROMISED TECHNICAL IMPROVEMENTS

Bombay THE TIMES OF INDIA in English 31 Jan 81 p 14

[Excerpt] New Delhi, January 30 (UNI)

The communication secretary, Mr. Ghosh, today held out promises of better performance of the country's telecommunication systems and of introduction of some of the latest innovations in the next four or five years.

Participating in a seminar on "radio reporting in today's India," at the session devoted to communication problems facing the news media, Mr. Ghosh said the new systems for telephones, telegraphs and the satellite would be introduced keeping in view the goal of self-reliance. Heavy and continuous import of communication technology would not benefit the country, he added.

A high-power specialist group had been working on evolving a rural communication service that would be reasonably cost-benefit, if not economically viable. The group will prepare a 10-year crash plan to ensure that no village is more than seven km away from a workable telephone.

He said the broadcasting and press media would receive help from the government in this field.

CSO: 5500

BRIEFS

ALL-INDIA RADIO TRANSMITTERS--New Delhi, February 1 (UNI): All India Radio is importing two "very powerful" transmitters to make its external service broadcasts less vulnerable to nature's vagaries and competing networks. The two instruments, each costing more than Rs. 2 crores, will be brought from Switzerland in June and put into operation around 1982, according to official sources. "Two may not be much compared to what we really need, but they would certainly help," one source said. The job at present is done with two transmitters which were installed in 1971. Listeners in many of the 55 odd countries to which AIR is supposed to beam its external service broadcasts complain they are seldom able to hear them. [Text] [Bombay THE TIMES OF INDIA in English 2 Feb 81 p 4]

CSO: 5500

BRIEFS

SECOND GENERATION PALAPA SATELLITES--The post and telecommunications director general told parliament on 17 February that the government would allocate $150 million for the launching of Palapa satellites B-1 and B-2 to replace the A-generation Palapa satellites. The satellites will cost $79,893,000; launching and insurance fees will amount to $49,500,000 and other expenditures, $20,556,000. [BK191355 Jakarta Domestic Service in Indonesian 1200 GMT 17 Feb 81 BK]

'ANTARA' DEVELOPMENT BOARD CHAIRMAN--Jakarta, 19 Feb (AFP)--Brig. General Murdiono was yesterday appointed chairman of the development board of ANTARA News Agency. Another job given to General Murdiono was acting secretary of the cabinet replacing Maj. Gen. Ismail Saleh. [Hong Kong AFP in English 1114 GMT 19 Feb 81 BK]

CSO: 5500

EXPERIMENTAL SATELLITE LAUNCHED, IN TRANSFER ORBIT

Largest Rocket Used

OW110903 Tokyo KYODO in English 0847 GMT 11 Feb 81

[Text] Tanegashima, Kagoshima Pref, 11 Feb (KYODO)--A rocket carrying an experimental satellite into orbit was launched here Wednesday evening by the National Space Development Agency. The N-2 rocket No 1 loaded with an ETS-4 satellite for technical experiment lifted off from the launching pad at the Tanegashima space center at 5:30 pm.

The rocket was originally scheduled to be launched last Monday but was postponed until Wednesday.

Officials said the rocket was designed to carry the ETS-4 satellite to the "transfer" orbital route, a step short of the stationary orbit to determine the rocket's ability to go into stationary orbit.

Under the agency's plans, the ETS-4 was aimed in an elliptical orbit completing each turn in about 10 hours and a half with a perigee of 230 kilometers and an apogee of 36,000 kilometers.

The N-2 model No 1 rocket is the largest of its kind developed thus far in Japan and its launching Wednesday marked the beginning of an era of satellites for practical use in Japan's space development program. The ETS-4 was to become the 21st Japanese man-made moon in orbit, including three launched outside Japan.

The National Space Development Agency has been using the N-1 model rocket for more than five years. But it said the N-1 model was not powerful enough to carry large-sized stationary orbital satellites for weather observations and communications in the second half of this year. The ETS-5 [as received] is 2.8 meters tall and 2.1 meters in diameter. It weighs 640 kilograms.

The agency announced that the ETS-4 satellite separated from the third stage rocket about 28 minutes after the lift-off according to schedule. It named the satellite "Kiku 3."

Named Kiku No 3

OW120239 Tokyo KYODO in English 0229 GMT 12 Feb 81

[Text] Tanegashima, Kagoshima Prefecture, 12 Feb (KYODO)--The 640-kilogram experimental satellite Kiku No 3, launched Wednesday evening by the three-stage N-2 rocket, has been placed into transfer orbit as planned, the National Space Development Agency (NASDA) said Thursday.

NASDA said signals from the orbiting satellite were caught at the Masuda tracking station on Tanegashima at 4:58 a.m. after the first orbit around the earth and at 5:04 a.m. at the Katsuura tracking station in Chiba Prefecture. It said the apogee and other detailed matters will not be known until Thursday night. Judging from data sent back by the satellite, however, the Kiku No 3 was believed to have been placed in the planned orbit, it said.

The agency said operations will be conducted on Sunday and on Tuesday to adjust the position of the satellite over the Equator. This will be followed by tests to be conducted for some three months on the plus-type plasma engine, tape recorders and other instruments carried by the satellite.

The N-2 rocket used for the launching is Japan's largest rocket and able to place a 350-kilogram satellite in stationary orbit. The N-2 is 35.4 meters long, 2.4 meters in diameter and weighs 134.7 tons.

CSO: 5500

BRIEFS

NHK BROADCASTS--Tokyo, Feb. 17, KYODO--Posts and Telecommunications Minister Ichiro Yamanouchi said Tuesday his ministry is studying measures to improve overseas radio broadcasts by the Japan Broadcasting Corporation (NHK). Speaking at a cabinet meeting, Yamanouchi said an international broadcasting service is important for better understanding. Yamanouchi said Japan could improve broadcasts to Southeast Asia by, or example, jointly launching a satellite with countries in the area. The issue was raised by Agriculture, Forestry, Fisheries Minister Takao Kameoka, who said he found during a recent trip to Southeast Asia with Prime Minister Zenko Suzuki that it is very hard to tune in to NHK's Radio Japan overseas radio programs. NHK broadcasts in more than a dozen different languages. [Text] [OW171209 Tokyo KYODO in English 0413 GMT 17 Feb 81 OW]

CSO: 5500

POOR CONDITION OF TELEPHONES, INFERIOR QUALITY OF REPAIR WORK NOTED

Vientiane VIENTIANE MAI in Lao 10 Dec 80 p 3

[Conversations With the Editor column: "Telephone, Telephone"]

[Text] Mr Vanthong in the Trade Service wrote a letter co VIENTIANE MAI and asked about the telephones. He wrote the following:

I am upset about the telephones in my office. I do not know why the telephones break down so often. When the telephones go out of order and the Telephone Center is informed, it takes months before people are sent to repair them. And only a few days after they are repaired, they go out of order again. When they break down again, [Telephone Center] is again informed and again it takes months to get them repaired. Such a situation is very upsetting and we do not know what to do about it. Concerning telephone communications, telephones facilitate carrying out some tasks. They speed up things, save time and so on. When the telephones cannot be used, this makes it necessary to contact people in person and this wastes time and gasoline. It is requested that VIENTIANE MAI inform the Telephone Center about this. What is VIENTIANE MAI's opinion about this?

[Answer] Mr Vanthong, actually, you did not ask us to simply reply but instead have asked us to present the matter to the sector concerned. Thus, the fact that your letter has been published in this column is the same as if it had been presented directly to the people concerned. It is requested that the people concerned take responsibility for this problem and take steps to solve it. In reality, we sympathize with this sector because this sector serves many people but it does not have enough equipment. Thus, it is only natural that repairs are slow and that repairs are not made as quickly as the customers would like. Concerning telephone service, we have experienced similar problems. For example, our telephone (No 2344), which has been out of order since last August, has still not been repaired. At present, we have two telephones (Nos 2133 and 2344) and both are out of order. After the telephone organization was informed of this, repairmen came and fixed them. But shortly afterwards, the telephones broke down again and now neither can be used. For our work, it is essential that we use the telephones. When we cannot use our telephones, it is as if we are deaf. If we need to contact someone, we have to send someone there and this wastes both our time and the time of the person being contacted.

Vanthong, we have asked the Telephone Center about this and they have told us that the reason that many telephones are presently out of order is that, first, the telephone lines are old and they often break and, second, the underground telephone cables are broken and the breaks cannot be located. Besides this, there are also problems concerning the service cadres, the vehicles and so on. With these problems it is not as easy to carry out these tasks as it should be.

These are the reasons given by the Telephone Center. However, we too do not know why it takes several months to repair the telephones. Thank you.

11943
CSO: 5500

BRIEFS

PORT SUDAN-TA'IF MICROWAVE NETWORK--Port Sudan, 29 Jan (SUNA)--The micro-wave network linking Port Sudan and Ta'if, Saudi Arabia, was opened here yesterday. In his address on the occasion, Communications Minister Dr. Ahmed El Sayed Hamad praised Sudanese-Saudi relations and cooperation in the many fields of development particularly in the domain of telecommunications. The project's total cost amount to $8.5 million shared equally by the two countries, according to the director of the public corporation for telecommunications, Mustafa Awad Allam. The 355 kilometer network which crosses the Red Sea from over two hills in Ta'if and Port Sudan, is operated by solar power and initially provides 300 telephone channels plus 96 telegraphic and telex channels besides a double way television channel. [Text] [Khartoum SUNA DAILY BULLETIN in English 29 Jan 81 p 3]

PORT SUDAN-JIDDAH MICROWAVE LINK--Khartoum, 30 Jan (SUNA)--Communications Minister Dr. Ahmed El Sayed Hamad yesterday opened the microwave network linking Port Sudan and Jiddah, Saudi Arabia. On his telephone call to his Saudi counterpart Dr. Alawi Kial, Dr. Ahmed expressed his happiness over the remarkable achievement that reflects the depth of relations between the two brotherly countries. The 355 kilometer network is the longest in the world. [Text] [Khartoum SUNA DAILY BULLETIN in English 30 Jan 81 pp 5, 6]

CSO: 5500

BRIEFS

DISSIDENTS' NEWS AGENCY--Islamabad, Feb 19 (AFP)--Afghan dissidents have set up another news agency to supply information about Moslem rebel activities (?in) their country. Afghan Information Centre, to be headed by French-educated former Afghan Governor Bahauddin Majrooh, has been announced two months after the establishment of a rebel news agency, Agence Afghan Press (AAP). According to its first release distributed here the A.I.C., having its head office in Peshawar, Pakistan, will "obtain directly accurate information about the real situation" in Afghanistan and supply the matter to the international mass media, individual researchers and scholars. "The non-profit, non-partisan organisation will work on financial aid provided by Islamic and friendly countries," it said. The centre will have its branch offices at Islamabad, Quetta in Pakistan and Paris. Sayd Fazal Akbar, former director of Radio Afghanistan and in charge of Persian and Pushtu programmes of Radio Moscow, who defected to Pakistan last year, has been appointed as deputy director of the Afghan Information Centre. [Text] [OW192024 Paris AFP in English 1900 GMT 19 Feb 81]

CSO: 5500

BRIEFS

FOREIGN OFFICES OPENED--The director of PARS News Agency has announced at a press conference that the agency will open 25 foreign offices to cover foreign and domestic news. He said Islamic and Third World countries will have priority for these offices. He added: arrangements have been made to open an office for the world liberation movements at PARS News Agency. The reason behind this is that Iran is going to become a center for broadcasting and distributing news concerning world liberation movements. [Text] [GF191859 Tehran International Service in Arabic 1730 GMT 19 Feb 81]

CSO: 5500

STATUS, FUNCTIONS OF NEWS AGENCY DEFINED

LD172026 Aden Domestic Service in Arabic 1630 GMT 17 Feb 81 EA

[Text] Brother 'Ali Nasir Muhammad, secretary general of the YSP Central Committee, chairman of the Supreme People's Council Presidium and chairman of the Council of Ministers, today issued Council of Ministers Order No 7/81 dealing with the organization of the ADEN NEWS AGENCY.

The articles of the order provide for considering the agency as a legally constituted body enjoying financial and administrative independence. Its work will be supervised by the chairman of the State Committee for Information. Its headquarters will be in the governorate of Aden and it is permitted to have branches within and outside the country.

The articles of the order stipulate its information task as spreading nationalist and progressive consciousness among the masses in accordance with the general policies of the YSP and the state. It will also distribute news, information, reports, and research papers issued by the YSP and the state. It will provide information and news about the achievements and activities of the toiling masses and their mass and social organizations in the economic, political, social and cultural fields. It will gather, organize and transmit news and information to the various news media in the republic.

The order stipulates that the ADEN NEWS AGENCY will gather, organize and distribute news and reports on the experience of the socialist countries, the world labor movement and the Arab liberation movement. It will acquaint the mass media abroad with the achievements of the toiling masses in the republic in the various fields of social development. It will prepare political, economic, social and cultural publications, reports and research papers.

The articles of the order provide that the capital of ADEN NEWS AGENCY will consist of the agency's fixed and circulating assets. The remainder of the articles stipulate that the chairman of the State Committee for Information will decide on the organizational regulations for the agency; that any previous stipulation contradicting the order is null and void; that the order is operative from the date of issue; and that it shall be published in the official gazette.

CSO: 5500

TELEPHONE LINES DEVELOPMENT REVIEWED

Jiddah ARAB NEWS in English 11 Feb 81 p 3

[Text]

RIYADH, Feb. 10 (SPA) — There will be 1.2 million telephone lines in Saudi Arabia by the end of the Third Five-Year Development Plan, Dr. Alawi Darwish Kayyal, the minister of posts, telegraph and telephones, told a two-hour Cabinet meeting Monday under Crown Prince Fahd.

After listening to a report by the minister on the distribution of the automatic telephone network over Saudi cities and towns, the Cabinet mandated Dr. Kayyal to sign the necessary contracts for completing the network.

Sheikh Hussein Mansouri, the minister of communications and acting information minister, said the Cabinet was then briefed by Commerce Minister Dr. Sobhan A. Solaim on a proposal to amend the corporate law to facilitate procedures for setting up new companies and to bring the law more in line with public interest. Adoption of the proposal was postpo..ed to the next session.

In other developments all cities and villages in Eastern Province were recently connected to the international automatic telephone network, according to Abdullah Al-Abbad, the province's telephones director.

Eastern Province residents can now dial 0 and immediately obtain their calls to 84 countries without calling the long distance call operator. The service is supplied to all ordinary telephone subscribers. Moreover, the new system will cut-down the cost of such calls, the official said.

Meanwhile, Dr. Kayyal Saturday announced that a new Saudi Telephone billing period was underway. He asked for the co-operation of all citizens in ensuring that all bills are paid quickly and efficiently.

The new billing period will continue for the next few weeks. All subscribers are asked to pay their bills before the "maturity date" — which is marked on all the bills — expires.

Subscribers who neglect to pay before the maturity date will have their telephones temporarily disconnected, and a late payment charge will be added to their next bill, Kayyal said.

Saudi Telephone's Medina District administration have requested that customers who either have their own post office box number, or who could use the P.O. number of a friend, to contact their Medina subscription office with the P.O. Box number.

This will help the Medina administration give better service to all customers by promoter delivery of invoices.

CSO: 5500

EXPERIMENTAL TELEVISION PROJECT OPENS IN MAPUTO

Maputo NOTICIAS in Portuguese 3 Feb 81 pp 1, 4

[Excerpts] The first phase of the experimental television project is opening today in the capital of the country; it will be launched through a special broadcast on the 3rd of February, the day commemorating Mozambican heroes. A total of 23 sets have been installed in various districts of the capital to enable the people to view the programs.

Jose Luis Cabaco, minister of information and member of the Party's Central Committee, stated that the launching of this operation is aimed at providing practical training for the competent cadre. This is one of the reasons why broadcasts will be on an irregular basis.

Today's broadcast is principally aimed at completing a general test of the equipment of the experimental television project. Thus, it will be of longer duration than the broadcasts planned for the days this initial phase will last.

During the second phase of this project, which will be inaugurated the last semester of this year, programs will be beamed on a more regular basis and will be planned for every weekend.

The minister of information stated that the objective of the experimental television project is to enable the party and the government to discuss the issue of establishing television in our country within the next two years.

Through this project, the training of cadres will include technical aspects as well as mastering the techniques of communication. At the same time, a research project will be conducted among the people to determine the existing deficiencies in the communication achieved through the various programs in order to ensure better-quality shows following the final establishment of television in the country.

CSO: 5500

SATELLITE GROUND STATION PROGRESS DESCRIBED

Niamey LE SAHEL in French 3-4 Jan 81 p 6

[Article by D. Tourawa]

[Text] Lt Col Sory Mamadou Diallo, minister of posts and telecommunications, and Mahamadou Halilou, minister of information, visited the construction site of a satellite ground station located 32 kilometers from Niamey on the Tillabery Road on Wednesday. They were accompanied by directors of television and the OPT [Postal and Telecommunications Office].

The station consists of two parts. The first part, for the national system, is to serve Agadez and Diffa. It is a station equipped with the necessary circuits for telephone communications. Agadez has 48 circuits and Diffa 36 outgoing circuits. Bilma will eventually have 6 circuits not integrated into the operation underway. The importance of this operation is twofold: First of all, within the framework of the needs of the ORTN [Niger Radio and Television Broadcasting Office], a channel is planned for television broadcasts and three radio stations. Transmissions will therefore be bilateral: Niamey-Diffa, Diffa-Niamey; Niamey-Agadez, Agadez-Niamey. When Bilma is operational, traffic will remain similar.

Satellite

Niger will rent a relay station on a satellite from Intelsat (International Satellite Telecommunications Organization). The second station will handle international telecommunications. It is equipped to work with foreign stations, which will permit much greater flexibility of operation. For the needs of the PTT [Posts and Telecommunications], it will handle telephone, telex and telegraph traffic.

International Connections

In addition, one should note that with this station, possibilities open up with respect to connections with all countries having a ground station and working in the Atlantic Ocean on satellites, as in the case of France, the Ivory Coast, Nigeria, Italy, the United States and Canada.

There are also other possibilities for television with respect to the transmission and reception of images. These possibilities of transmissions between countries exist in keeping with the agreements with Intelsat.

One should also mention the existence of a link which accompanies the station between Niamey and PK [kilometer marker] 32. However, between Agadez-Arlit, there is a large-capacity link to handle telephone and telex traffic and the needs of the ORTN.

Just as between Niamey and PK 32, there are links between the Agadez station and the city, the Diffa station and the city, which is a small-capacity link of 24 circuits.

Television Transmitters

It should be pointed out that in this operation, television transmitters, television equipment, ambulances, housing and vehicles to transport personnel are planned. However, there is a telephone central at Diffa and Arlit. The one in Agadez will undergo some modifications to allow for automatization.

Some 38 technicians are planned for the entire operation. The total cost of the operation is an estimated 16,790,461,256 francs. This amount includes equipment for the PTT and the ORTN, as well as the training of personnel for the two offices. The OPT has already trained personnel.

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CSO: 5500

BRIEFS

RAILWAY TELECOMMUNICATIONS--A four-man team of Japanese experts has arrived in the country to start a two-month techno-economic study of Zambia Railways telecommunications network, a railways spokesman said in Kabwe yesterday. The team is led by Dr Teruo Habara who is project leader, and includes Mr Ripzo Goto, senior telecommunications engineer, Mr Makoto Hashiguchi, telecommunications engineer and Mr Mitsuru Takatsuki, an economist. The study, which seeks to establish an appropriate mode of telecommunications to be adopted by Zambia Railways, will cost K90,000, the spokesman said. [Text] [Lusaka TIMES OF ZAMBIA in English 3 Feb 81 p 1]

CSO: 5500

EXPANSION PLANNED IN RADIO, TELEVISION BROADCASTING

Kiev PRAVDA UKRAINY in Russian 4 Dec 80 p 4

[Article by correspondent V. Petrenko: "Soon to be on the Air"]

[Text] Experts from the Republic Radio and Television Center (RURT) of the Ukrainian SSR Ministry of Communications are preparing new equipment in the transmission network to be released for service. This was related to our correspondent by Yu. I. Omel'yanenko, member of the ministry collegium, chief of RURT and candidate of technical sciences.

More than 70 percent of the republic's inhabitants are now able to receive two television programs, while more than 16 percent can receive three. Communications experts have commissioned 13 powerful transmitters for the second and third programs in excess of the number planned. They have exceeded by more than a factor of two the Five-Year Plan requirements for the construction of new radio-relay lines which transmit programs to television stations. Moreover, more than 2,000 km of operating radio-relay lines have been renovated, and now not only the first but the second and third programs can be transmitted along them as well.

Experts from RURT have also modernized and renovated obsolete equipment which was unsuitable for color television. This made it possible to offer quality color television over a territory in which more than 80 percent of the inhabitants of the Ukrainian SSR reside.

Much has also been done for the technical development of radio broadcasting. We intend to almost double by the end of this year the volume of FM stereophonic broadcasting in the VHF band in the Kiev district. In 1981-1982 we intend to expand the network of such broadcasting throughout the republic.

There are now 40 television transmitters operating in the UHF range. By the end of 1981, their number will increase to 50-55. The natural question arises: what has brought about the necessity of transmitting television broadcasts in the UHF range? This is a question with which certain problems are associated. The fact is, in the densely populated and comparatively compact territory of the Ukraine as well as in the territories of neighboring union republics and a number of contiguous foreign countries, the number of television transmitters operating is so

great that if new transmitters were to operate in the VHF range, it would only lead to an increase in mutual interference. The use of the UHF band greatly increases the quality of television reception and makes it possible to practically eliminate interference of electromagnetic origin. The main thing is that the transition to this range is the only way to develop two and three-program television.

In order that television viewers can receive transmissions being broadcast on UHF, special adapters are necessary. Such adapters for collective use (attached to antennas located on the roofs of buildings), however, are not yet being commercially produced. Individual adapters cannot be of use in many areas, since UHF waves almost totally lack the ability to bend around obstacles. It is for this reason that the question of commercial production of collective UHF adapters must be solved now.

Next year the construction of a television station in Kerch' and a three-program transmitting telecaster in Khar'kov will have to be completed. We must also put into service a powerful UHF television transmitter in Kramatorsk as well as provide a second television program in Ternopol' and a number of other cities.

In the near future, powerful television stations with domestic UHF transmitters will be commissioned in Kholmy on Chernigovshchina and in Bershad' in Vinnitskaya Oblast.

Workers at the Republic Radio and Television Transmitting Center in Kiev together with Czechoslovakian experts are setting up a UHF transmitter produced in the Socialist Republic of Czechoslovakia--for a fourth television program. It is proposed that it be commissioned at the beginning of 1981.

On a model of the television tower standing near his desk, Yu. I. Osel'yanenko pointed out where the transmitter and the antennas for the new frequency range are located. It is best of all, however, to see it in real life. One needed only to exit the RURT building, located not far from the base of the 380-m steel giant. From below, the upper control-room structure reminds one of a round red box with windows on all sides. It is here, 200 m above the ground, where the transmitter for the fourth program is installed.

The antennas, however, are installed much higher. The frame for the fourth program was built beforehand. When the tower was still being built, the highest section was installed.

That day is now not far off when the signals from the new program's transmitter will rush along the cable within the tower's shaft, depart the antenna and go on the air.
[9512-4]

9512
CSO: 5500

BRIEFS

NEW TELEVISION SATELLITE--In accordance with the program for the further development of television broadcasting systems employing artificial earth satellites, the latest in the "Ekran" series of television broadcast satellites was launched from the Soviet Union on 26 December 1980. [Text] [Moscow TRUD in Russian 28 Dec 80 p 1] 9512

NORDIC DATA NET TO BE WORLD'S MOST MODERN

Stockholm NY TEKNIK in Swedish 11 Dec 80 p 4

[Article by Tina Lundh]

[Text] All trips in Scandinavia will be booked through the same system. It is being developed by SJ (Swedish State Railways), SAS (Scandinavian Airlines System), and the Norwegian domestic airlines. The Smart data system is a decentralized system, in which all parties involved have their own computers. They will keep in contact with one another through the Nordic computer network.

The travel agencies will have a direct connection to the booking system of the network. A train ticket for a trip in Denmark can be purchased at a travel agency in Kiruna without the agent lifting the telephone and ordering it. In a minute, the ticket arrives by way of a printer.

The Nordic computer network is a prerequisite for Smart. At present, the computer network is 2 years behind schedule and it is estimated that it will be complete in 1982. Smart will begin to be installed in April 1982 and will be complete in 1984.

Smart will tie together airlines, railroads, bus lines, charter companies, hotels, car rental agencies, travel agencies, shipping lines, and insurance companies for travel insurance.

Terminals, ticket printers, and a control unit will be installed at the travel agencies. The control unit will tie together the terminals at the agency.

The terminals are so-called intelligent terminals. They contain a microcomputer with a 128,000 bit memory.

The terminals, ticket printers, control unit, and software will be delivered by Svenska Philips.

"We chose Philips because they are the cheapest," project director Rune Nilsson, SJ, said at a meeting with the travel agencies last week.

The travel agents are not connected directly into, for example, SJ's computer. Their messages first pass through an adaptation unit, an exchange. All travel related

companies (SAS, railroad companies, etc.) have this equipment, which does not tie them down to a particular computer or data system. SJ can change its internal system without having any effect on Smart. Instead, they adjust their exchange, the adaptation unit.

At the travel agency, the travel agent does not contact SJ's booking system before he has chosen date, the route, the discount category, etc. For large systems such as SJ, there are timetables, catalogs, and price information stored locally in the control unit. This saves time and reduces communications costs.

The system will be financed by membership fees, and the terminals and adaptation equipment will be leased.

The travel agencies and transportation companies will also pay hookup and usage fees to the Nordic computer network.

At present, Smart is one of the most modern systems of its kind. West Germany has a highly centralized system for travel booking.

In Great Britain there is an older decentralized system.

[Boxed item] "Smart is smarter than its name. The large travel agencies are favored, while the small ones, in effect, are kept out by the high membership fees."

"Sure, Smart is good, but we cannot make up our mind in 10 days. It would mean tying up our company until 1987."

The debate between the project leadership and the travel agencies and agents was long and the project leadership was subjected to much criticism.

Rune Nilsson, project leader from SJ and Bosko Jansson, SAS, looked worried. They had expected to hear the decisions of the agencies and agents so they can sign contracts with Svenska Philips before the end of the year. Now the agencies and travel agents are hesitant, which may delay the introduction of Smart.

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CSO: 5500

BRIEFS

YLEISRADIO TELETEXT SYSTEM--Lahti will be the sixth town in Finland to get a so-called telephone television service, Telset. Through the Telset system a specially equipped television can transmit, for example, news. The service is offered by private telephone companies; in many companies local newspapers are also involved. The other towns with Telset companies are Helsinki, Kotka, Jyvaeskylae, Tampere, Turku and probably Pori. Alongside the private Telset companies "Yleisradio" [Finnish Broadcasting Company] is developing its own teletext system and trials may start next autumn. The system is different in that telephone lines are not needed, the message is transmitted as text on the screens with the television signals. Televisions with special equipment will thus receive the text automatically throughout the country. The system makes it possible for the 300,000 or so with a hearing disability to view television. The Swedish-speaking population, amounting to 300,000, too, can receive all programs translated. Through the teletext system "Yleisradio" news, sports results, announcements and anything else can be transmitted. At this stage there are only about 2,000 users of television texts in Finland, while the figure for Sweden is about 30,000. New televisions will have the additional equipment built in which will make teletext a common occurrence in a few years. Sweden believes that by 1985 there will be over 500,000 users. [Excerpts] [LD231210 Helsinki Domestic Service in Finnish 1040 GMT 21 Feb 81]

CSO: 5500

MISSION, STRUCTURE OF CNET EXPLAINED

Paris L'ECHO DES RECHERCHES in French May 80 pp 83-85

/Article by Joseph Zyss, telecommunications engineer with the Optics Department, Office of Materials and Transition (RPC/OMT) at the CNET Paris B Center, and editor-in-chief of L'ECHO DES RECHERCHES: "The National Center for Telecommunications Studies"/

/Text/ All major spheres of human activity henceforth will see their strides closely linked to the future of telecommunications.

This community of interest is further strengthened by the growing convergence of technologies and applications in the fields of telecommunications and data processing.

The list of different disciplines and economic sectors concerned with this development extends beyond the boundaries of science and technology to include all activities involving the transfer or processing of information. Thus the optical fiber used by a physician to observe an internal disease depends on technological advances engendered by research into new materials for optical telecommunications.

Likewise, the possibility opened to the economist or historian of consulting archives of data stored electronically at a distance multiplies their capacity to sort, analyze, and compare.

Finally, at the scale of macro-economics, the success of a policy of decentralization or of opening up isolated regions is largely conditioned by the possibility of linking the area concerned to the economic metropolis by means of high capacity communications resources.

Conversely, there is hardly a field of knowledge from which progress in telecommunications does not benefit. Like space research, telecommunications research is a catch-all, and also a propagator in all directions of spin-offs in the short or long run; the ravenous hunger of telecommunications feeds indiscriminately from the most esoteric domains of pure mathe- sociology, psychology, solid-state physics, ionosphere properties, etc.

The National Center for Telecommunications Studies stands at the crossroads of those needs. Its role is to delve in the whole gamut of human activities to nourish the impetus of telecommunications.

It is to provide technical and scientific answers to outside requests, and even to anticipate them, for such is the multiplicity, a priori, of the various scenarios of possible futures.

Thus CNET's role is that of controller and middleman, but above all it is a creative one, as indicated by the missions which it has been assigned.

As an interministerial agency founded just after World War II and placed under the supervision of the General Telecommunications Directorate, CNET necessarily saw its powers and the thrust of its missions evolve since then, as functions of both ambient technical developments and growth in the equipment of the national telephone network.

Thus quite recently, in 1979, CNET was reorganized in order to face up to an evolving technical and economic context marked by three new factors:

Priority objectives set by DGT for quantitative development of the telephone network have been or are by way of being attained: 4 million subscribers in 1969, 14 million in 1979, 20 million in 1982;

The telematics explosion, leading sooner or later to videocommunications, will bring a qualitative revolution in the nature of the network, and will need the support of a considerable effort for technological renewal;

In more general terms, the French economyrelies on telecommunications and the new products they generate in order to supply a considerable portion of our exports and insure sustained activity by enterprises concerned.

In view of this analysis, CNET has updated its objectives, its structure, its integration within DGT, and its position vis-a-vis outside industrial and research organizations.

CNET Missions

The duality of its missions is an expression of CNET's concern--while actively preparing for short and medium term network development as well as for long term changes--at the same time to lend its aid to present-day telecommunications.

The primary mission of CNET is to participate actively in innovation so as to become one of the major world centers of telecommunications-related technology. This internal research effort should place CNET teams on a par with the best teams the world over. Among research objectives assigned on a priority basis by DGT to CNET, we make particular mention of microelectronics, optical telecommunications, optoelectronic technologies, telecommunications satellites, telematics terminals, and new services.

The second mission of CNET consists in technical assistance and expertise for the Industrial and International Affairs Directorate as well as for the development services of the General Telecommunications Directorate. DAII activities in terms of research contracting, approval of materials, drafting of specifications, and industrial support in fact depend on CNET's technical capabilities.

CNET must, moreover, maintain a constant dialogue with development services in zones, regions, operational offices, the DTRN and DTRI [extensions unknown], as with the Production Directorate; it assures that new materials are expeditiously and harmoniously put into service; and it is alert to the opinions of users in the field in order to assure the best possible adaptation of new products to the many operational constraints.

Structure

The structure which appeared best adapted to accomplishment of those missions is first characterized by two prominent features:

A high degree of decentralization into five centers, each in time to include from 500 to 800 persons, endowed with a large measure of autonomy, and organized in terms of clearly defined objectives;

A constant concern to orient or reorient research with a view to its high level of competitiveness, which is jointly guaranteed by seven program committees and a consultative scientific committee, as well as by the CNET management.

Within that framework, tasks have been apportioned as follows among the five CNET centers:

The Grenoble Microelectronics Center (the most recently established CNET center). To meet the growing demand for integrated circuits, it is fitting to assure that the national entity has the mastery of all design, fabrication, and modification associated with N-MOS and C-MOS [extensions unknown] technologies. The Grenoble Silicium Microelectronics Center, whose mission this is, was created in 1979. It then numbered 70 persons, a complement which will be doubled in 1980 and tripled by 1981;

The CNET Paris A Center is concerned in the broad sense with management of the general telecommunications network in a manner to permit its optimal response to a permanent technical and economic evolution. Its area of competence particularly includes problems of change-over, traffic, maintenance, and network security;

The CNET Paris B Center has a dual vocation of directed basic research in properties of materials and external geophysics, together with applied research in technologies and components, functional devices and sub-assemblies. In addition it is responsible for transmission and satellite activities, including TELECOM 1;

The CNET Lannion A Center clearly states its vocation as a local network to provide new services in such research fields as time multiplex communication, distributed filing systems, and man-machine distribution and communication;

The CNET Lannion B Center. Though apparently diverse, its concerns are closely linked, and include optical transmission systems with their electronic components, rapid digital transmission systems with microwave components, and approval and testing of components;

Finally, the CCETT [Joint Television-Telecommunications Studies Center and the Joint Post Office-Television St dies Center in Rennes, which are in the process of reorganization, and a portion of which will become the sixth CNET center.

Two agencies, closely linked to the Director of CNET, are concerned with technical coordination of those activities as a whole: the DICET [Cooperation, Information, and Technical Exchanges Directorate], charged with permanent oversight of proper dissemination, both internal and external, of technical information, and which in consequence is specifically responsible for the supervision of L'ECHO DES RECHERCHES; and the DIGAT [Management and Technical Assistance Directorate], which is responsible for relations between CNET and development services.

The secretary general is responsible for administrative management of CNET. The military deputy provides for coordination of interministerial action.

Seven planning committees organized in relation to overall topics share in supervision of annual planning document drafting by the various centers.

Those documents take stock of the progress of current programs, assess the advisability of their continuation, and propose new topics for study and means to be employed. The Board of Directors makes final decisions.

The Scientific Consultative Committee, whose establishment is planned for 1 July 1980, will have an essential role in orientation and evaluation of research projects conducted at CNET. The diversity of its membership, which will include scientific figures of high competence and appointees from different ministries, should guarantee the objectivity of its counsels and their conformity to the general interest.

CNET's Outreach

As it is with any living organization, the vitality of CNET is a function of the quality and frequency of its exchanges with the outside world. Three groups of privileged partners with CNET can be distinguished:

The General Telecommunications Directorate (network development, DAII). Earlier, with reference to organizational structure, mention was made of

our concern that this agency have constant access to the technical potential of CNET. This problem manifestly cannot be solved exclusively in terms of catwalks linking organization charts; goodwill and human contacts are also needed.

To that end the DGT is concerned to break down isolation in working careers by encouraging mutual exchanges of personnel between development services and CNET;

Universities and research centers, both French and foreign, must be made increasingly aware of telecommunications problems and be convinced of their universality.

There as well, beyond the radiating influence of CNET teams themselves, personnel exchanges--with CNRS [National Scientific Research Center], for example--are destined to play a growing role. Moreover, the different scientific committees, as well as an agency under DAII, will see to it that the originality and orientation of research programs compare favorably with those conducted in the best competing centers the world over;

Industrialists, whatever the size of their enterprise, must be able to rely on the development and transfer of technologies born in laboratories. CNET must therefore directly stimulate the capacity of French industries to take competitive places in the international market.

Conclusion

This rapid presentation of CNET shows an agency in the process of complete renovation indicating its vitality and open-mindedness.

Though he inevitably confronts the recurring issues which are inherent in all research activities, a young CNET engineer hardly has time to be affected by the existential problems which characterize academic activities somewhat removed from the surrounding world.

Whether his interest lies in packet communication, cryptology, or solid spectroscopy, he will always find both the limitations and the stimulus of a social demand which contributes to the enrichment of his work.

To give rise to the most advanced technological progress, while remaining attentively aware of neighboring socio-economic aspirations--therein surely lies the vocation and deep raison d'etre of CNET.

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CSO: 5500

ELECTRONIC SWITCHING, TELEMATICS FUTURE EXAMINED

Paris L'ECHO DES RECHERCHES in French May 80 pp 5-10

[Article by Louis-Joseph Libois, senior counsel at the Accounting Court, former director of CNET, and Albert Glowinski, chief telecommunications engineer at the Paris A CNET Center: "From Electronic Switching to Telematics, Prospects for The New Decade"]

[Text] The past decade saw the concurrent development of signal digitization, stored program switching, and information processing networks. This three-fold combination is the precursor of an irreversible trend toward the complete digitization of communications and switching. Its influence is however more profound because it makes it possible to reconsider the functions of networks, beginning with distribution networks, in terms of service diversification and integration: the emergence of telematics services, with their wealth of resources, is at the heart of the technical, economic, institutional, and social transformations that are awaiting telecommunications.

Signaling Through Signal Channels

With the development of stored program electronic exchanges, it becomes natural to allow the computers of these exchanges to conduct a dialogue through direct connections called signal channels. As a result, the signaling, meaning all the information that needs to be communicated for the network exchanges to coordinate their actions in routing calls, is completely separated from the communication channel established between terminals. Superimposed then on the telecommunications network itself, is a signal network which plays a role somewhat similar to that of a nervous system. The advantage of this concept is that it allows a considerable enrichment of the dialog, and it is an essential condition for the introduction of the new services. CCITT (International Consulting Committee for Telegraphy and Telephones) has defined two signal channel signaling systems: one (No 6), uses analog circuits and has been placed in operation in the United States; the other (No 7), uses digital circuits and is more generally applied, namely in Europe and Japan. System No 7 is consistent with integrated service digital networks (RNIS).

Packet Switching

Packet switching is a transmission technique which makes it possible to time-share the use of a network's resources (circuits and switches) by fragmenting the communications into autonomous messages (packets) identified by a destination address. The network becomes completely interposed between users, allowing communication among terminals which are not directly compatible with each other.

The 1976 CCITT specification of an international connection standard (Approval X 25) has considerably helped these developments. The French network TRANSPAC was placed in operation at the end of 1978, after a joint economic company was created at the end of March to promote teleinformation processing in PME's (small and medium-size enterprises) as well as in large organizations. With its 12 switches at the beginning of 1980, this network covers all of France and already serves about one thousand terminals.

Telematics: From Narrow Bands to Videocommunications

The word telematics, introduced in the NORA-MINC report, designates all that results from the intermingling of telecommunications and information processing. In more recent forecasting studies, it would appear worthwhile to make the following distinctions:

All the applications that involve only telecommunications and data transmission at rates that are not excessively high (below the Mbit/s domain);

The domain of wide-band services, essentially the transmission of interactive moving images such as television with return channel or videophonics. These videocommunications can also adopt several forms, as for instance videomatics, which would require a digital network integrating all the services.

These two domains have a number of essential differences of a technical and economic order. Moreover, they do not necessarily concern the same categories of users, and should correspond to different historical circumstances.

Technologic Changes in Networks: Electronics and Digitization

Studies on digital telecommunications techniques date back more than 30 years, but it is only in the early 60's that we saw the first operational transmission systems using pulse and coding modulation (MIC), and time multiplexing of several telephone lines: 32-base (30 conversation channels) MIC systems in Europe, and 24-base systems in the United States.

A new stage was reached with electronic switching called time-switching, based on time multiplexing and signal digitization, which was started in France in 1970 at Perros-Guirec and Lannion (Cotes-du-Nord) with the first PLATOS exchanges, prototypes of the future E 10 system.

Electronic space-switching, which uses neither multiplexing nor coding, became operational several years earlier in the United States with the opening of an exchange of this type at Succasunna, New Jersey in 1965.

Whether in terms of space or time, electronic switching introduces into telecommunications a new fundamental feature, information processing. We are dealing with stored program switching systems: the information processing program replaces the cabled logic of conventional exchanges. This explosive entrance of the computer certainly marks the beginning of a new era in telecommunications.

New concepts arose subsequently, and information processing outgrew the strict framework of switching to introduce itself into the actual conception of networks. In the United States notably, the stored program network concept slowly became a reality thanks to the progress made in signaling systems (common channel interoffice signaling).

In France, CNET (National Center for Telecommunications Research) pursued studies in the same direction and formulated a signal network doctrine, meaning a separate network devoted exclusively to the transmission of signaling information.

Together with the information processing aspects of telecommunications, computers are also tending to interconnect and communicate with remote peripherals. The emergence of remote data processing and of new forms of telecommunications is particularly well illustrated by packet-switching data networks (Telenet, Datapac, Transpac, Euronet, and so on). Information processing and telecommunications are becoming increasingly more interlocked.

This three-way meshing of information processing, signal digitization, and electronic switching, is leading researchers and engineers toward a new concept of telecommunications networks. Integrated service digital networks (RNIS) have been envisioned for several years already: France calls its network a global telecommunications system, England and Canada use the term integrated service digital network, and Japan is trying to promote the idea of a total communication network. In short, whatever their name, it is believed that telecommunications networks will tend to constitute vast systems capable of transmitting as well as processing, all sorts of digital, or digitized, information.

Until now however, this global system concept has had only a limited practical effect: given the enormous imbalance between the telephone service and other services, such as telex or remote information, the multi-service character of telecommunications is still more promising than real. In fact, even in the United States, telephones currently represent over 95 percent of the telecommunications traffic and income. France's case is even more characteristic: until recently, we had no need of sophisticated market prospecting methods to be aware of the extremely urgent demand for telephone service. The "22 to Asnieres" syndrome, which is not very ancient history, was a clear indication of priorities.

It is therefore within the context of this intensive growth of the telephone network, that digital techniques had to demonstrate their technical-economic advantages. And as is often the case for new technologies, they were penalized with respect to older solutions which had almost reached their assymptotic costs. Yet, even as early as the beginning of the last decade, digital transmission and time switching found roots in some areas:

Because it could time-multiplex 30 telephone lines on two symmetrical pairs, MIC provided a pair-gain of 15 and consequent substantial savings on the infrastructure, and thus became widespread in short-distance connections among telephone exchanges;

And because from its inception, time-switching proved to be competitive in low density urban areas, France took a world-leader position with its E 10 exchanges.

Today's remarkable progress in microelectronics, which has resulted in a spectacular drop in the price of functions and memories, offers entirely new technologic and economic horizons, which will accelerate the current changes taking place in telecommunications.

Also contributing to this trend is what we might call the synergy of digitization. As soon as one function, such as transmission in urban networks, is digitized, an increasingly favorable environment is created for the digitization of other functions, such as the switching of subscriber lines in this case, since the integration of techniques makes it possible to avoid the analog-digital converters that are indispensable in hybrid networks. The digitization of the network is therefore a process which tends to spread out starting with its first applications. The installation by CNET of the PLATON experimental integrated networks in the early 1970's, was the seed of an evolution which today seems irreversible. It is already affecting interurban transmissions, regional and inter-regional connections, and will accelerate further with the digitization of time-transit centers.

Also because of the progress in microelectronics, the technique of time-transit will now offer considerable advantages in investment and operation costs when compared to electromechanical systems, even in an analog transmission environment. That is why only time-transit centers are being currently being placed in operation, not only to create new sites, but in most cases also to replace crossbar centers which would have needed extensions.

This digitization of time-transit will in turn reverse the terms of economic comparison in favor of long-distance transmission. Moreover, in addition to the economic criterion itself, which is associated with the elimination of analog-digital conversion devices, quality demands also argue in favor of technique homogeneity: multiple analog to digital conversions, and vice-versa, cannot be performed without signal degradation.

The attached table shows the progression of digitization rates forecast for 1985 and 1990, for transmission and switching. As we can see, digitization will be very advanced in 1990, even though it will not be complete and even though the convergence of the percentages is not total. But we must understand that technical-economic optimizations are planned for very long durations, as a function of the inertia found in the gigantic systems formed by telecommunications networks, which today are still almost entirely analog.

The New Goals: Communications Services

In this respect, even if as we have seen, the dialectic between technologic progress and the weight of the past is increasingly leaning in the direction of digitization, both in switching and in transmission, the connection of subscribers, which is called distribution networks, is another matter.

Anticipated digitization of the French network

Functions	Digitization rate (%) 1985	1990
Time-transit switching	50	90
Interurban circuits	35	70
Local circuits and urban connections	80	100
Subscriber switching	40	70 to 80

In fact, with the dimensions that they will attain in a very near future, the existing wire pair networks will certainly provide sufficient resources for the near term expansion of the telephone network. Even if they are developed very rapidly, and even if they offer great advantages in absolute terms, digital systems for subscribers will only find a marginal market if they limit themselves to offering savings in telephone connections. The problem is in fact posed in terms of service digitization, and reopens the opportunity for a true multi-service distribution network.

The question of service integration thus becomes increasingly timely, while at the same time appearing in a totally new perspective, since the potential service explosion, which is called telematics or videomatics, leads to a serious reconsideration of the model to which the telephone has accustomed us.

To begin with, the notion of universal service will no longer necessarily be the rule. The professional sphere will thus probably become a preferred area for service development in such specific areas as office information and banking telematics. The same will be true for collective uses of telecommunications, such as teleconferences, which will multiply, notably in video. A service will thus also be characterized by the nature and number of its users.

But even more profound reappraisals could arise with the introduction of new forms of communications, and particularly videotex. Specific problems are created by man-machine dialogs in terms of interpersonal relationships. And especially, profound changes are taking place in the relation between telecommunications and the content of the information being moved.

In interpersonal services, whether telephones or eventual videophones, the installation of a terminal and a transmission channel is sufficient for users, who produce in real time the information which they are exchanging. For all the services that can be encompassed by videotex, a network and terminals must be complemented with data bases which are the actual services. The true service is no longer the possibility of an exchange of information, but the information itself.

All things considered, none of these are incompatible with network digitization -- on the contrary, in fact -- nor with service integration: the digitized signals are apparently identical, no matter which services are being considered. But if service integration appears possible today as a result of technical progress, the same progress can also lead to many other solutions, and in particular to functional assignments among terminals and networks, solutions that are no longer similar to the conventional structures of telephone networks.

The present thinking is that not even one model of service diversification will be presented in the next few years. The articles which follow will show how, with the partial integration of certain services and certain networks, and faced with the emergence of various levels of services involving different agents, the sociopolitical, economic, and institutional aspects that had remained in shadow until now, will be placed in the foreground.

There is no doubt that telecommunications has reached an important milestone. For one hundred years, the expansion of telecommunications has relied essentially on the development of a telephone service following the path of a notable but steady technologic progress. For the short and intermediate term however, technologic progress seems to make possible such a variety of services and means to achieve them, that almost paradoxically, technical criteria should play a less determining role in future options. In other words, after a long period of time during which it was more a question of demand than of supply, the situation has been reversed. To the network objectives are now added, and even substituted, service objectives.

As we have seen, it is in this framework that we must examine the digitization of subscriber distribution. But in reality, not many fields escape this new domain, as demonstrated by satellite telecommunications and fiber optics transmission.

These two innovations should play a determining role in the future, as we shall see in this issue. They are expected to offer certain specific advantages, such as the following major ones:

Great access flexibility and quasi-instantaneous network reconfiguration possibilities for multiple-access satellite systems;

Very wide bands and significant amplification steps for fiber optics transmission.

It is very likely that in their first applications, these techniques will replace or complement more conventional means in existing networks. This is already an accomplished fact for intercontinental satellite connections which, as part of a great increase in international traffic, will represent about one-third of the submarine cable capacity. The first achievements for fiber optics are expected before 1985, for interconnection of urban environment exchanges. Longer distance connections should be introduced during the 80's in the interurban network. The introduction of fiber optics submarine cables could actually occur even earlier, since the inertia of a network infrastructure will not have to be overcome in this domain.

In this light, we thus witness the pursuit of a technical evolution which in this case essentially involves digital transmission networks and enriches an already large number of choices, ranging from symmetrical pair or coaxial cable networks, to radio waves and even circular wave guides. However, even this type of application must take into consideration the new situation in the telecommunications market: the competitiveness among new technologies, and the planning of their introduction and eventual expansion, depend very closely on traffic evolution, whether on telephones or other widely used services.

But for a large number of other applications, the justification depends much more directly on service objectives:

Fiber optics distribution involve wide band services, which means primarily interactive moving images such as teledistribution or videophones;

Satellites involve specialized systems of enterprise communications, a prime example of which is TELECOM 1, or of direct television broadcasting.

In either case, the interest of these applications will become defined and narrowed in competition with other solutions, depending on a large number of considerations, many of which are of a non-technical nature. Here again, everything indicates that the options could vary as a function of the specific nature of the services being considered, and that moreover, these options would not be immutable with time.

This sketches for the future an extremely open gamut of options and an increasingly varied choice of paths. However, even if these choices also create uncertainty, and if the questions for the future tend to increasingly be voiced in non-technical terms, we must not lose sight of the fact that technologic progress remains one of the essential moving forces of telecommunications evolution and of human societies in general.

The strategic importance of components, and of microelectronics and optoelectronics in particular, is a clear illustration of the above. Moreover, we are now witnessing a veritable programming explosion, and its balance with hardware progress is undoubtedly one of the crucial problems of the next 20 years.

The role of researchers thus remains primordial. But at the same time, the nature of the questions openend for the future must stimulate them more than ever, to widen their horizons to match the new prizes that are awaiting telecommunications, both nationally and throughout the world.

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TELECOMMUNICATIONS RESEARCH AT CNET REVIEWED, UPDATED

Paris L'ECHO DES RECHERCHES in French May 80 pp 31-40

[Article by Michel Camus, general engineer for telecommunications, director of the Grenoble CNET Center: "Silicon Microelectronics at CNET"]

[Text] The most recent of the CNET (National Center for Telecommunnications Research) units, located in Grenoble, has been in operation since the last half of 1978. This article summarizes the aims that have led to its creation, generated both by the domestic needs of the French telecommunications network and by international circumstances. The current trend is toward increasingly tight integration of MOS circuits on areas that approach one micron (VLSI), leading to substantial cost reduction. The silicon microelectronics research being conducted in Grenoble is aimed at:

A mastery of fabrication technologies, closely coupled with the study of physical mechanisms;

The development of design and test equipment adapted to the increasing complexity of the "fleas" (chips);

The perfection of machinery and automation which will assure the industrial profitability of the new plants.

The introduction of semiconductor components, first as discrete components and then as integrated circuits, originated a profound change in all areas of telecommunications. It is unthinkable today to design such equipment without integrated circuits: they are currently found in switching and transmission equipment -- modulation, coding, filtering, and so on -- and will soon be installed in distribution networks. Because they encourage a closer bond between telecommunications and information processing, they will make it possible to open the prodigious era of telematics. They will endow terminals with intelligence and memory, and will direct the traffic of information exchange on the future multi-service networks.

Major equipment specifications, namely size, consumption, cost, and reliability, already depend on the performance of integrated circuits. Consequently, those with the earliest access to the best components will control this equipment. It

therefore appears essential to manufacture, in France, the integrated circuits which the French telecommunications industry will require in order to build the highest performance equipment at competitive prices. In final analysis, it is the survival of this industry that is at stake.

Within the framework of these goals, which tend to strongly enhance the national potential for microelectronics research in the public sector, the government decided on 23 May 1977 to establish a specialized CNET center for integrated circuits. On 21 December of the same year, it also decided to locate this new center in the Grenoble area, so that the center would benefit from a particularly favorable technical and industrial setting, and so that it could more readily collaborate with the integrated circuits research and production units already located in that region.

This center began to operate in 1978 in temporary quarters. In 1980 it will move to new facilities now under construction at Meylan, in the suburbs of Grenoble. The center's research is focused on silicon microelectronics.

Toward Ever Greater Integration

The growth of integrated circuits is characterized by the search for tighter integration, making it possible to place an ever increasing number of elementary functions on a single silicon surface (a chip). Following intermediate-scale and then large-scale integration, we are now entering the era of very large scale integration (VLSI).

Cost reduction is and will remain the main reason for the use of integrated circuits in electronic equipment -- notably in telecommunications equipment -- and for seeking ever tighter integration. Cost reduction has two aspects:

Reduction of direct costs, that is, of the component price in terms of its elementary function. This reduction in turn has several origins:

Reduction of the silicon surface covered by an elementary function (higher density of leads or transistors per unit area);

Increased number of circuits simultaneously fabricated in a given operation on each chip, this increase resulting both from reduced elementary-component dimensions, and an increase in the size of the silicon wafer;

Concurrent improvement in manufacturing yield;

And of course, the familiar learning curve phenomenon, according to which the sales price of semiconductor components drops steadily as the quantity of manufactured components increases. The price-drop rate observed from 1964 to 1972 has consistently been 28 percent for each doubling of the cumulative quantity of manufactured components.

Reduction of indirect costs as a result of the utilization of integrated circuits in equipment construction, which entails:

Table 1. Evolution in the size of circuits.

Parameter	1976	1979	1985
Size of chips (square mm) (in production)	4 x 4	6.5 x 6.5	11.5 x 11.5
Resolution (micrometers) (in production)	6	3	1
Number of transistors per chip (other than memory)	10,000	80,000	1,000,000
Wafer size (inches)	3	4	5

Reduced equipment size with all its consequences, especially in terms of facilities costs (both from the standpoint of necessary quantities of concrete and of floor space requirements, the price per square meter of land in urban areas being extremely high);

Reduced energy consumption per function performed, the resulting savings being felt much more in terms of power installations (investments) than of consumption as such (operations);

Higher reliability, due mainly to the fact that the use of integrated circuits considerably reduces the number of connections, which are one of the chief causes of breakdowns.

The figures in table 1 will provide a better idea of the rapid rate of development of circuit integration.

It is expected that between 1976 and 1985 the integration density (number of transistors per unit area) will increase by about a factor of 10, while the area of each chip will also be about 10 times larger. The number of transistors on each chip will thus be multiplied by a factor of 100, and could surpass one million by 1985. At the same time, it is also expected that the size of the silicon wafers will be much larger (and could even exceed five inches!). The performances indicated in table 2 are given with respect to each lead. The operating speed and consumption figures are extremely important. It is particularly useful to know that power dissipation is one of the factors which currently limits the development of integration.

A consideration of orders of magnitude alone demonstrates a considerable increase in reliability, which together with integrated circuits, enables achievements which were not possible until now. This is particularly true for avionics, but can equally well be the case in telecommunications, since reliability improvements makes it increasingly possible to decentralize certain operations.

Fabrication Technologies

The two families of silicon integrated circuits that are being used are the bipolar and MOS circuits, which differ in their principles of operation. Within each family there are several types of circuits which use specific fabrication technologies, which in turn consist of an ordered succession of a large number of well determined elementary operations. There are therefore as many fabrication technologies as there are types of integrated circuits.

Table 2. Evolution of circuit performance.

Parameter	1976	1980	1985
Speed in nanoseconds (internal lead)	6	2	1
Dissipated power per lead (mW)	3	0.5	0.25
Speed x power product (pJ)	18	1	0.25
Power dissipated by package (watts)	1	1.5	5

Historically, the first integrated circuits were bipolar ones. As their name indicates, these are devices in which the electrons and holes contribute simultaneously to electrical conduction: their operation essentially involves the current flowing through junctions between materials of different characteristics.

The first generations of bipolar circuits are practically extinct today (RTL: Resistor-Transistor Logic; DTL: Diode-Transistor Logic). But other generations have taken over and continue to be developed; they are the TTL (Transistor-Transistor Logic), and its variants the ECL (Emitter-Coupled Logic) and I2L(Integrated-Injection Logic). As a whole, the present advantages of these circuits are their high performances, either in operating speed (ECL case) or in consumption (I2L case). On the other hand, their fabrication is delicate and they lend themselves rather poorly to integration, except perhaps for the I2L circuits.

MOS (Metal-Oxide Semiconductor) circuits invoke a totally different operating principle, based on the flow of electric charges of a single type (electrons or holes) in a semiconductor material. This flow takes place in an area called a "channel," between two electrodes called source and drain, and controlled by a voltage applied to a third electrode (the gate) which acts on the channel through a thin layer of silicon oxide. Depending on the doping of the semiconductor material of the channel, the circuits are known as PMOS or NMOS, with variations corresponding to the nature of the gate material (such as in the case of Aluminum-Gate PMOS, or Silicon-Gate NMOS).

Along with PMOS and NMOS there are several other types of MOS circuits, beginning with CMOS (Complementary MOS) and going on to DMOS, VMOS, HMOS (highest performance version of NMOS), MOS/SOS (MOS whose substrates are not silicon but an insulator, Corindon in this case). Also included are charge-transfer devices, which are derived directly from MOS and whose utilization goes beyond the domain of integrated circuits: they can in fact be used as targets (image sensors) for solid state cameras.

Compared to bipolar circuits, the advantage of MOS integrated circuits is that they lend themselves much better to large scale integration.

Bipolar circuits are still widely used today in the telecommunications domain, but they will progressively be displaced by MOS circuits, which are expected to capture over one-half of the market, with about 30 percent for NMOS circuits alone.

Product Evolution

As we have mentioned earlier, the essential characteristic of integrated circuits is that they are evolving toward an increasingly tighter integration. This trend has existed ever since the birth of these devices, and is firmly pursued by all the research and development laboratories working in this area. In fact, no expert would hazard a guess today about the actual physical limits of very large scale integration. Everyone speaks of submicronics, which means that tomorrow's dimensions for elementary components will be smaller than a micron. It is expected in the future that more than one million transistors will be integrated on a single chip.

However, a slight slowdown is currently noted, which is not due to technologic or physical limits in the means being used to fabricate integrated circuits, but rather to a lack of imagination about the devices that could be fabricated by making the best use of the available technologic resources. There is no doubt that a general conceptual effort in this area will overcome this transient, and even temporary slowdown (similar to the phenomenon that was observed between 1965 and 1968).

In this light, two types of products currently appear to have a promising future: the so-called semi-custom products, and intelligent products,.

Semi-custom products are circuits that contain a certain number of independent elementary-operation blocks, which are interconnected according to customer requirements to achieve a well defined body of operations.

This product is of interest because the design of an integrated circuit with a large number of elements is an extremely expensive operation, whose cost will increase as the integration becomes more complex. Such a circuit must be therefore be built in very large numbers in order to amortize the cost of the design; for economic reasons it will thus become impossible to order custom circuits, except in very specific circumstances. It will, however, be possible to start with a mass produced semi-custom product and obtain a desired operation, simply by requesting connections adapted to a given problem to be solved.

Intelligent products -- microprocessors, microcomputers, and so on -- offer the advantage that their range of utilization increases with their size, meaning with their power. Conversely, it is easy to understand in the case of circuits that are not endowed with intelligence, that their specificity grows with their complexity, narrowing down their utilization slot.

Some authors forecast that by 1981, intelligent circuits will represent about 30 percent of the integrated circuit market.

As we have already stated, the functions to be fulfilled by integrated circuits in the telecommunications domain are numerous and varied. Some are very specific by their very nature (codecs, modems, filters, and so on). For others, which justifiably require a certain intelligence (microprocessors), it was possible to say until now that it paid to use catalog components and adapt them to a given specific problem by means of adequate programming. In fact, even in this area, the development of specific components (such as MAC 4 and BELL circuits) is being sought today, because of their following advantages:

They are polyvalent and programmable, and a simple program can define their function and specify their specialty. This obviously involves a large programming activity, that is, notable program development;

They allow a simple fabrication of evolving systems: a system change will be absorbed by a simple and uncomplicated change in programming.

Ultimately, and this is extremely important for CNET, all the products used in the telecommunication domain will have to be developed by teams with concurrent competence in systems and in components.

Integrated Circuits Industry

The integrated circuits industry can be briefly characterized by three essential features: it uses fragile manufacturing processes, it is undergoing a very rapid evolution, and it is subject to a constant expansion.

The operations that are involved in the manufacturing processes of integrated circuits are very numerous, and some of them (such as diffusion, oxidation, wafer cleaning, and so on) are relatively precarious. In fact, no control means is available for in situ observation of these operations' effect on on each device. In the absence of such control, the results of the operaition can be verified only after the fact. At that time it is generally to late to intervene, and if the result is bad, there is no recourse and no repair is possible: the bad, wafers have to be discarded.

This explains why manufacturing yields for integrated circuit in general are not good, and at times catastrophic. In fact, manufacturers are not outspoken in publicizing their yields; but current orders of magnitude in this respect are generally well below 50 percent!

Moreover, mastery of a fabrication technology which involves dozens of successive operations, is precarious: it sometimes happens that manufacturers (and not the worst ones) sometimes lose control of their technology.

The second aspect of the integrated circuit industry which deserves mention, is its extremely rapid evolution. Harsh competition forces a search for ever decreasing production costs, which stimulates the industry to rapidly evolve its manufacturing methods. Enterprises thus do not hesitate to abandon machines that are still in good condition, in order to replace them with newer and higher-performance ones, so as to become more competitive. In one recent example, the shift from 3 to 4 inches in the diameter of the silicon wafers used for integrated circuits, has made it possible to acquire for very good prices, diffusion furnaces, designed to handle 3-inch diameter wafers, since these furnaces are being replaced by others which are capable of handling 4-inch (100 mm) wafers. It goes without saying that this policy, which contradicts the conventional ideas of depreciation, contributes to perturbations in the integrated circuit market.

The last feature of the integrated circuit industry is its prodigious expansion, which continues to be very rapid. Caught in a recurring cycle -- needs to be satisfied, new products, severe competition, price drops, greater needs --

Table 3. Evolution of circuit reliability (Motorola MC 6800 microprocessor, from IEEE SPECTRUM, May 1979).

Years	Failure rate (% per 1000 hours)	MTBF* hours (-years)
1974	1.27	78,000 (9)
1975	0.5	200,000 (23)
1976	0.12	833,000 (95)
1977	0.08	1,700,000 (194)
1978	0.013	7,700,000 (877)
1979	0.006	17,000,000 (1900)

*MTBF: Mean operating time at specifications, or mean operating time between two failures.

integrated circuits are under an endlessly increasing demand. It is in fact difficult to understand, and even to predict, the rate of this growth: the recent examples of personal calculators and electronic watches are good demonstrations of the experts' poor predictions in this domain.

Because of its rapid evolution and constant expansion, it would appear that this industry is undergoing a change of appearance.

First of all, it is increasingly becoming a heavy industry through the magnitude of its environment and the means which it employs. The cost of the equipment used to manufacture integrated circuits is increasingly high. The equipment itself is increasingly large, heavy, and complex, notably the machines that are used for circuit layout on the silicon substrates (electron beam and X-ray machines). As a guideline, table 4 shows the magnitude of the prices of the equipment that must be installed in a basic production unit (estimates at the end of 1979).

Moreover, this industry is heading toward an extremely high level of automation. Indeed, the use of automatic machinery makes it possible to reduce some labor costs while offering a better control of operations, which improves the process and increases manufacturing yields. It is therefore not surprising that increasingly greater efforts are being made to automate, which will have two consequences. The first is that the aspect of the industry will change profoundly in the coming years. It will certainly come to resemble the chemical industry: input of raw materials, output of manufactured products, and in between, hermetic tubes and tunnels in which all manufacturing operations will be performed automatically, under the control of powerful computers. The second consequence, and an obvious corollary of the first, is that we will witness a progressive transfer of added value to machines, control programs, and maintenance. As we will see, this will influence the choice of research activities.

To conclude this rapid examination of the integrated circuit industry, of its major characteristics, and its evolutionary trends, we must delve for an instant on a particularly important point. Because of its constant expansion, this industry is encountering non-negligible difficulties:

Table 4. Cost of major equipment per integrated circuit production unit (in million francs).

Manufacturing plant	15
Testing	4
Masking department	5
Assembly	2.5
Quality control-reliability	1
Design (CAO)	3.5
Environmental testing	15
Total	46

There is a shortage of competent personnel both in France and in the Silicon Valley of California. This causes companies to overbid in enticing qualified personnel away from one another.

This shortage becomes evident in the area of integrated circuit production machinery. Delays in the delivery of some of these machines are already extremely long, of the order of 18 months.

And finally, the supply of silicon is causing some problems. There is of course no shortage of silicon on earth, but the production capacities of plants capable of transforming it and bringing it to the level of purity required by the integrated circuit industry threatens to become inadequate. The world's major producers of very high quality polycrystalline silicon are increasing their production capabilities. But some large producers of integrated circuits might nevertheless envisage the installation of their own silicon production lines. It is thus not impossible, according to some observers and experts, for a crisis to arise between 1981 and 1983, particularly as a result of the growing demand for photovoltaic cells. It would be appropriate for France to also take steps in this direction.

The Integrated Circuit Market in Telecommunications

According to several estimates which are in reasonably good agreement, we can expect that the world integrated-circuit market, which amounted to 3.9 billion francs in 1970, will reach about 65 billion francs in 1985.

We can also expect that telecommunications will represent about 15 percent of this market at that time, or approximately 10 billion francs distributed as follows:

United States	5.0 billion F
Japan	2.5 billion F
Europe	2.0 billion F
Other countries	0.5 billion F

It is interesting to compare these orders of magnitude to other data about previous consumptions or other forecasts. In 1978 for instance, it is estimated that about 4 billion francs was spent on all the semiconductor components (discrete and integrated circuits) installed in the telecommunications equipment sold throughout the world, of which nearly 60 percent was spent by the United States alone.

Another comparison can be derived from a study carried out at the end of 1977 by the Directorate for Industrial and International Affairs (DAII), on the consumption of integrated circuits by the French telecommunications industry between now and 1985. According to the results of this investigation, the integrated circuit consumption could go from 500 MF (million francs) (basic hypothesis) to 900 MF (rougher estimate), which is entirely consistent with the forecasts reported above. Yet the total French production of integrated circuits in 1978 was of the order of 300 MF.

The DAII study also indicates that the most significant portion of this market will be devoted to NMOS circuits (32 percent), followed by CMOS, with the MOS circuits covering more than 50 percent of the market. These results are corroborated by other, more recent forecasts from the United States, according to which, when all applications are combined, the NMOS (conventional or high performance HMOS) would by themselves represent nearly 50 percent of the world consumption of integrated circuits.

Telecommunications thus provide a considerable potential market for integrated circuits, particularly for MOS circuits. All the manufacturers in the world are striving to secure the best position in the field. Their interest is additionally stimulated because telecommunications aise delicate problems, which are factors of progress, whether it is a matter of fabricating very fast and low consumption circuits, or circuits capable of withstanding high voltages.

As to research in silicon microelectronics, three aspects are of interest.

a) This research is moving extremely rapidly, and its results must be transferable to industry in the shortest possible time.

b) The research must be linked to production: in order to manufacture circuits, whether experimentally or in order to set up industrial fabrication, silicon microelectronics technology must be available and mastered.

Since the operations involved in the fabrication of integrated circuits are so numerous and interact in such complex ways it is impossible to evaluate the progress achieved in any one of these operations without verifying its results against the finished product. At the same time, it is at the level of industrial fabrication that research must bear fruit, and the problems to be solved must therefore be studied on an actual manufacturing tool.

c) Nevertheless, this research requires some initial fundamental physics work. In particular, it is now acknowledged that in order to achieve sub-micron circuits it will be necessary to better understand the physics of condensed matter by extrapolating from the atomic scale to microstructures, rather than the reverse. For example, physical, chemical, and electrical phenomena at interfaces between thin films are very poorly understood. A combination of complementary disciplines, materials, and advanced equipment are needed to successfully conduct research on this scale.

The Grenoble CNET Microelectronics Center

It is in this context that the General Directorate for Telecommunications has assigned the following mission to the new CNET research center located in the Grenoble region: the goal sought by the creation of the CNET Integrated Circuits Center is to bring into the nation a mastery of the major fabrication technologies for integrated circuits, so as to place the French industry in an innovative position.

The integrated circuits research that will be carried out at the Grenoble CNET Microelectronics Center will obviously have to respect these general considerations. The major areas in which the center will have to work (and which were defined from the outset in 1977) are the following:

Circuit design and testing;
Fabrication technologies and associated physics research;
Machinery and automation involved in the manufacture of integrated circuits.

In each of these areas, the following specific considerations will be taken into account.

Design and Testing:

The growing complexity of circuits requires a research effort aimed at the logical organization of circuits, particularly for testing purposes. This implies a significant increase in the power of assisted-design tools, and in particular of computer-simulation programs;

Very large scale integration makes it possible to include an ever increasing number of elementary functions on a given component, functions which must be optimized in terms of this integration, and which must be combined so as to accomplish the indispensable complex functions of the telecommunications field;

Although advanced research has already been conducted on basic elements (memories, leads, and so on), they can still be improved both in design and as a result of technologic progress. Models can be perfected for better utilization in computer-assisted design techniques;

These various studies will have to be complemented with physics studies of devices, whose principal objective will be the application of physics phenomena to component feasibility, with the grasp of physics phenomena determining the operation of components and the detailed modeling of devices.

Technologies and Physics Research:

The increased area of silicon wafers and the reduced dimensions of patterns require an improvement in the quality of materials, whether these are silicon (substrate fabrication, epitaxy, defect studies, thermal and mechanical properties) or fabrication products (photosensitive resins, gases, chemical products, and metals);

The reduction in dimensions demands the evaluation and development of new microlithography processes (electronic masks, X-rays, and so on);

The largest effort will be devoted to fabrication processes (oxidation, metallization, and passivation) and to associated physics research (ion-matter interaction, diffusion mechanisms, and so on). The general orientation will be the quest for a low temperature fabrication technology.

Machinery and Automation:

The preceding pages have already mentioned the need for research in high-performance machines (such as electronic masking), and in computer programs, for both design and testing;

Rapidly evolving technologies require the concurrent development of appropriate tools (furnaces, implanters, epitaxial reactors), which cannot take place in France without activity in this field;

The need to reduce costs has already led to automation of assembly operations. This automation must be extended to all manufacturing processes; a significant effort must be made in this respect.

The major strategies established since 1977 at the CNET Research Center have been complemented as follows:

Emphasis will be placed on NMOS and CMOS models aimed at logic circuits that are very complex, fast, and of very large scale integration, and to erasable memories with information-conservation without expense of energy.

Studies will be devoted from CAO up to System Architecture, machines for submicron technologies, and component modeling and characterization.

The results of this research will have to be applicable to products which will perform functions that are in wide demand.

More quantitatively, the question is sometimes raised about the ambitious goals that the recent microelectronics research center in Grenoble has set for itself. Obviously, if the center wants to remain competitive, it will have to establish goals that are at least equivalent to those planned by the best of the competition, such as the Japanese, whose 1977 VLSI plan (ELECTRONICS, Vol 50, No 26, 22 December 1977, p 63) stated:

Logic: 0.5 nsec speed for 2000 leads;
Memories: 1 Mbit with 500 nsec access time;
Geometry: 0.5 micrometer line width;
Crystals: less than 10 defects per centimeter square;
Wafer diameter: at least 6 inches.

Update For 1 January 1980

The CNET Grenoble Microelectronics Center began operating during the second half of 1978 in temporary buildings, in Meylan, in the eastern suburbs of Grenoble. On 1 January 1980 it had 70 employees, 46 of which were engineers and senior research personnel, 11 of the latter being PhD's and 12 third-year doctoral candidates.

This competent and high-level personnel started its first studies primarily on:

The architecture of various microprocessors and microcomputers designed for specific problems in telecommunications;

The design of several circuits incorporating new ideas on circuit testing;

Research on new CAO tools (notably the definition of design specifications for an integrated CAO system);

Various problems in circuit testing, assembly, and encapsulation;

Installation of extensive equipment for characterizing materials and technologies;

The systematic study of material treatment with energy beams (including ion implantation, and laser or electron beam heating);

New methods for low temperature oxidation;

Microlithography.

During this time, construction was started on the new buildings which will house the center beginning in October 1980. These buildings, which are of modular construction, will include a pilot plant equipped with all the modern means necessary for the fabrication of integrated circuits. This plant will be used by all the research activities conducted in the center.

In any case, it is expected that the center will not be fully operational before 1982, and that its major results will not be exploitable before 1983-1984.

It is thus reasonable to ask if it will succeed, and if it will not be too late by then. But in answer to the second question, it is fairly safe to say that it will not be too late because:

Forecasts agree that in 1985-1986, silicon will still amount to 95 percent of the world's integrated circuit production, with GaAs just beginning to appear in the remaining 5 percent in a very specialized area of application;

At that time MOS will be meeting over 50 percent of the needs, with a marked preponderance of high-performance NMOS;

Industrial production in the micron range will not be achieved before 1985, and much still remains to be done in research and development toward this goal.

It would clearly be presumptuous for us to estimate the chances for success: we can say however, that CNET enjoys a privileged situation to the extent that it benefits from varied and complementary skills, involving circuits and systems as well as components. One condition for success certainly relies on the ability to integrate the new Grenoble center with other CNET centers, and especially the circuit design teams of the latter, which are already successfully at work.

We will thus simply formulate a wish, echoing Norbert Segard's words at the laying of the Grenoble CNET cornerstone on 13 November 1979: "May the success of this new center make the Grenoble region the European Silicon Valley."

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TELECOMMUNICATIONS AGENCY REORGANIZES TELEGRAM SERVICE

Stockholm TELE in Swedish No 4, 1980 pp 11-13

[Article by Torbjorn Andstrom]

[Text] The date 3 May 1977 is important in the history of the National Telecommunications Administration. This is the date on which the reorganization of Swedish telecommunications was begun in accordance with the decision made at the beginning of that year, following the recommendation from the 1972 telegraph report, which was to give the telegraph service a modern and rational organization capable of handling the increasing traffic volume.

The changes made immediately were the elimination of the greetings telegram service and elimination of telegram delivery by messenger. Also depositing telegrams "in the slot" was eliminated, and the concentration of staff, that is reduction of the number of telegraph stations, each with its own central for phoning in telegrams, and telegram rooms, was begun in accordance with a time plan. Depositing in the slot could, however, be retained in places where local authorities consider that the need for such depositing exists. Service to customers, when the concentration is completed, will otherwise be handled from only two places in the country, Gothenburg and Stockholm. Telegram service should in the future be merchandised as a complement to the other services offered by the telecommunications agency. It should be the last resort to be used when no other means of communication will serve the customer's purpose.

The new organization can be seen schematically in the sketch accompanying this article.

The reorganization was generally completed by 30 June 1978. The following is a summary of the effects of the reorganization.

As to the volume of traffic, the changes will only affect domestic traffic. The largest part of domestic traffic consisted of congratulatory messages sent by the greetings telegram form. Since the greetings telegram is now eliminated, domestic traffic is going to be drastically reduced, from 570,000 telegrams during fiscal year 1976/77 to 209,000 during fiscal year 1977/78, or by 63 percent. Corresponding numbers for foreign traffic showed a reduction from 450,000 to 368,000 telegrams,

or a reduction of 18 percent, and that is somewhat more than the normal annual reduction of foreign traffic during the 1970's. The total number of domestic and foreign telegrams declined during the same period from 1,020,000 to 577,000 telegrams, a reduction of 43 percent.

Improved Economy

The economic consequences have been positive. The telegram service during the 1970's (and even earlier) suffered a large economic deficit. The economic goal at the beginning of reorganization was that smaller fixed costs should be achieved after rationalization and rate increases were carried out. During fiscal year 1976/77, which was the last year before the organizational changes, the telegram service (telegraph branches less leased lines) had a deficit in the amount to cover fixed costs of 25 million kronor. During the reorganization period, which included fiscal year 1977/78, this deficit declined to 10 million kronor. During fiscal year 1978/79, after completion of the reorganization, the amount available to cover fixed costs came to plus 7 million kronor. Preliminary figures for last fiscal year, 1979/80, show that the amount available to cover fixed costs was a plus 6 million kronor. There are now plans to change the economic goals for telegram service so that all operational costs can be covered.

There was hardly any customer reaction. In the few complaints which were heard, criticism was mainly directed against the elimination of deliveries by messenger. That mainly concerned telegrams with congratulatory contents, now sent on the usual telegram form, which is no longer delivered by hand, but is read to the addressee on the telephone, or in cases requiring such courtesy, read to the restaurant manager, hotel porter or the like, for further delivery to the addressee. For the telecommunications agency the handling of such telegrams was complicated, and finding the addressees took more time than was desirable. The transmitting clerks were often forced to do time-consuming research of telephone numbers to find addressees, with resulting time delays. The number of telegrams with congratulatory messages on ordinary forms also became larger than expected. In order to avoid messenger delivery of such telegrams a system was established to allow the customers to request these to be sent as so-called mailgrams at a reduced rate. The mailgram is sent directly to the addressee without a prior attempt at delivery by telephone. However, mailgrams have not heretofore been in great demand. About seven percent of telegrams with congratulatory messages are now sent my mailgram.

Transmission by Terminals

As reported above, the telegram service now has its place in the telecommunications group of services as a complement to other services. It follows that as new telecommunications services arise from technological developments, customers' need for telegram service will decline. It is therefore important that further possibilities to rationalize be watched for, and that the organization and layout of the telegram service fit the demand as closely as possible so that the loss of service experienced previously will not be repeated. In the streamlining which will come in 1981 TV terminals will be introduced in the transmission of telegrams. These TV terminals will be used for receiving telegrams from customers by telephone and telex. The telegram is then written in at the TV terminal, put into the prescribed format, and is then fed into the telecommunications system's computerized telegram handling

system ATESTO in Stockholm. Furthermore, measures have already been taken to prepare for further concentration of telegram activity by discontinuation of the telegraph station in Gothenburg. This discontinuation, however, is not expected to happen before 1 July 1985.

While telegram activity in Sweden now generates an amount to cover fixed costs, in other countries they still have not been able to put telegrams on their feet economically. The reorganization of the Swedish telegram system was made possible by the great telephone density in Sweden, and because of this delivery by messenger could be eliminated. Such conditions do not exist in most other countries.

Even if the total amount of telegram traffic continues to decline, the demand for telegram service or similar service will continue in the foreseeable future. This judgment is based on the fact that while telegram traffic with the industrialized countries declines, traffic with many countries in the third world is increasing. If one thereby concludes that regular utilization of new communication services, mainly in the industrialized countries, often demands the acquisition of sophisticated terminal, and that such services are not going to be used by ordinary people for economic reasons, it is clear that the demand and requirement for manual service is going to remain. The existing telegram service should thus as long as possible adapt to conditions created by technical development. Within CEPT [expansion unknown] discussions are now being held on possibilities of adapting the international telegram service to existing requirements by trying to modernize and simplify the operational conditions and rules of transmission in order to reduce costs.

Today's opinion is that the telegram service will remain within the foreseeable future, although not necessarily in its present form and with its present name.

Torbjorn Andstrom is employed in the marketing division, section for text communication, at the central administration of the National Swedish Telecommunications Administration, and is responsible for the organization of the telegram service.

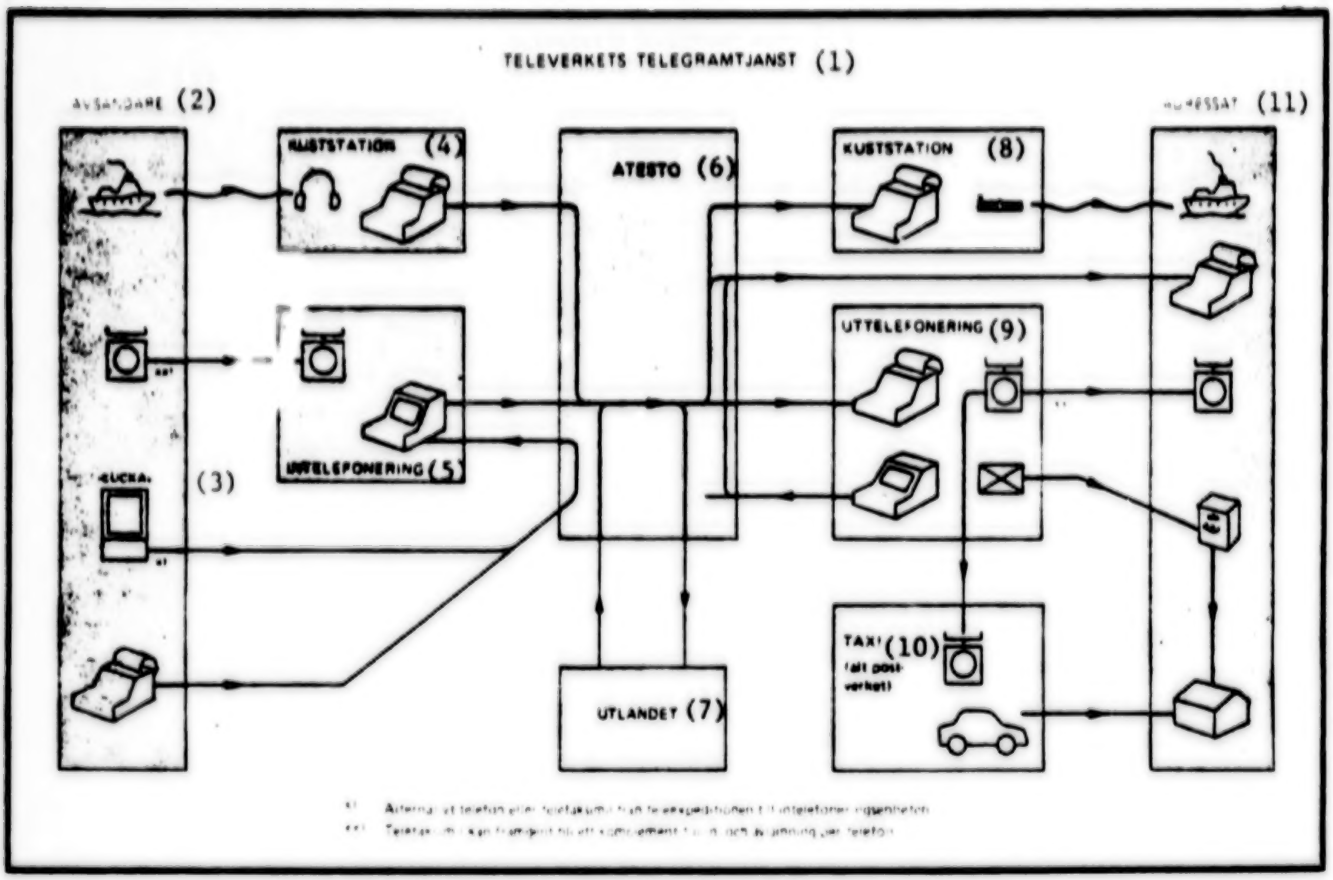

Figure 2. Telecommunications Administration's New Telegram Organization

Key:
1. Telegram service of the Swedish Telecommunications Administration
2. Sender
3. "Slot"
4. Coastal Station
5. Dictated by telephone
6. ATESTO [Computerized telegram handling system in Stockholm]
7. Foreign
8. Coastal Station
9. Delivery by telephone
10. Taxi (alternative to mail)
11. Addressee

x) An alternative to telephone or telefacsimile from transmission station to receiving unit for telegrams dictated by telephone.
xx) Telefacsimile can in the future be a complement to sending and receiving by telephone.

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9 March 1981